(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 041 681 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.10.2000 Bulletin 2000/40

(51) Int. Cl.[7]: **H01R 13/74**

(21) Application number: **00300639.2**

(22) Date of filing: **28.01.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **31.03.1999 JP 9051399**

(71) Applicant:
SHARP KABUSHIKI KAISHA
Osaka 545-8522 (JP)

(72) Inventor: **Takeguchi, Mitsuhiro**
Osaka-shi, Osaka 547-0043 (JP)

(74) Representative:
Brown, Kenneth Richard et al
R.G.C. Jenkins & Co.
26 Caxton Street
London SW1H 0RJ (GB)

(54) Electronic equipment terminal connector

(57) An electronic equipment terminal connector (30) of the present invention is to be attached to an electronic equipment chassis (22) by inserting a portion (32b) of an insulator (32) composed of a plurality of terminal pins (31) linked to one another into an opening section (22a) of the electronic equipment chassis (22) so as to make an electrical connection between the terminal pins (31) and a substrate portion (27) in the electronic equipment chassis (22), and the electronic equipment terminal connector (30) is provided with a stop section (32c) which stops the insulator (32) on the electronic equipment chassis (22) while the portion (32b) of the insulator (32) is inserted into the opening section (22a) of the electronic equipment chassis (22).

FIG. 1 (b)

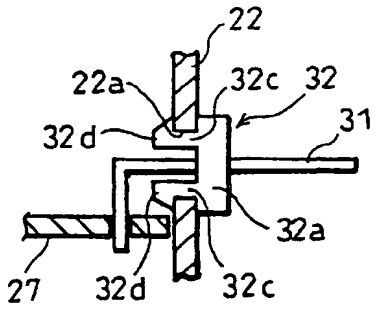
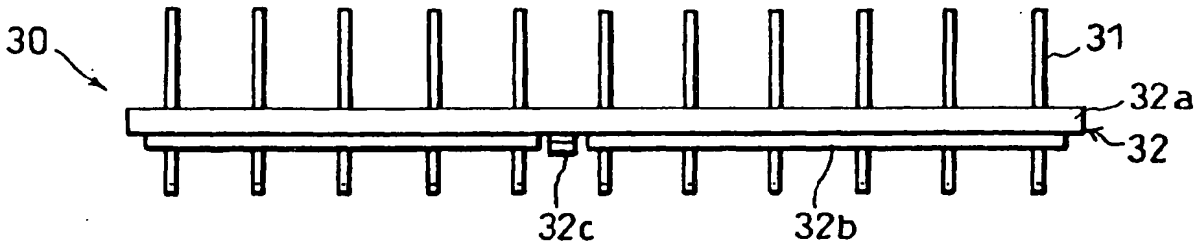


FIG. 3 (b)



EP 1 041 681 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to an electronic equipment terminal connector, electronic equipment, and electronic equipment terminal connector unit suitable for electric tuners used in television receivers, VCRs, satellite broadcasting receivers, and other electronic devices.

BACKGROUND OF THE INVENTION

[0002] Electric tuners used for television receivers, VCRs, satellite broadcasting receivers, and other electronic devices are one example of electronic equipment which is provided with an electronic equipment terminal connector in which a plurality of terminal pins are linked to one another by an insulator.

[0003] To bring the electric tuner in actual operation, it is required to externally supply a voltage for driving amplifier circuits, local oscillator circuits, and frequency converter circuits in the electric tuner, and also a synchronize voltage for synchronizing band-pass filters of input circuits and inter-stage circuits, and PLL control data when making the synchronization by PLL.

[0004] For such a purpose, the electric tuner employs a connection terminal for the external connection. As such a connection terminal, feed-through capacitors and terminal pins have been known conventionally.

[0005] Fig. 8(a) and Fig. 8(b) show an electric tuner employing feed-through capacitors as the connection terminal, in which Fig. 8(a) is a front view of the electric tuner and Fig. 8(b) is a plan view of the electric tuner of Fig. 8(a).

[0006] As shown in Fig. 8(a) and Fig. 8(b), the electric tuner has an arrangement in which a plurality of feed-through capacitors 121 are provided on one of the side surfaces of a chassis angle 122, and an antenna input terminal 123 and antenna output terminal 124 are provided on another side surface of the chassis angle 122, i.e., the surface perpendicular to the surface on which the feed-through capacitors 121 are provided, and an upper shield cover 125 and lower shield cover 126 are provided on upper and lower surfaces of the chassis angle 122.

[0007] In this electric tuner, the plurality of feed-through capacitors 121 are fixed on the chassis angle 122 by solder. In the chassis angle 122, the terminal sections (not shown) of the feed-through capacitors 121 are connected to a print substrate (not shown).

[0008] Fig. 9(a) and Fig. 9(b) show an electric tuner employing terminal pins as the connection terminal, in which Fig. 9(a) is a front view of the electric tuner and Fig. 9(b) is a plan view of the electric tuner of Fig. 9(a).

[0009] In this electric tuner, instead of the feed-through capacitors 121 as shown in Fig. 8(a) and Fig. 8(b), a plurality of terminal pins 128 are directly inserted and solder fixed on a print substrate 127 provided in the chassis angle 122.

[0010] The electric tuner employing feed-through capacitors as the connection terminal has drawbacks that it is more expensive than the electric tuner employing the terminal pins and it takes more time to make connections.

[0011] Meanwhile, in the electric tuner in which terminal pins as the connection terminal are directly fixed on the print substrate, because individual pins are merely soldered directly on the print substrate, the terminal pins tend to come off easily and the problem of weak terminal portion is presented.

[0012] In order to increase the strength of the terminal portion, there has been proposed an electronic equipment terminal connector 130 as shown in Fig. 10(a) through Fig. 10(e) for connecting an external power source, etc., and electronic equipment, in which Fig. 10(a) is a front view, Fig. 10(b) is a plan view, Fig. 10(c) is a bottom view, Fig. 10 (d) is a left side view, and Fig. 10(e) is a right side view.

[0013] The terminal connector 130 has an arrangement in which a plurality of terminal pins 131 are linked to one another in a straight line by an insulator 132 of a rectangular shape. Such a terminal connector is disclosed as a capacitor array, for example, in Japanese Unexamined Patent publication No. 153596/1990 (Tokukaihei 2-153596) (Published Date: June 13, 1990).

[0014] Fig. 11(a) and Fig. 11(b) show an electric tuner to which the terminal connector 130 having the above arrangement is attached, in which Fig. 11(a) is a front view and Fig. 11(b) is a plan view.

[0015] As shown in Fig. 11(a), the terminal connector 130 is arranged such that the insulator 132 is fixed on the chassis angle 122 by a fixing tongue 141. Here, as shown in Fig. 12, the terminal pins 131 are connected to the print substrate 127 in the chassis angle 122. Fig. 12 shows a main portion of the cross sectional view of Fig. 11(a) taken along the line X-X.

[0016] The following describes how the electric tuner employing the terminal connector 130 is assembled, referring to Figs. 11(a) and (b) and Fig. 12.

1. The antenna input terminal 123 and antenna output terminal 124 are fixed on the chassis angle 122 by bezel or solder.
2. The terminal connector 130 is attached to the chassis angle 122.
3. The print substrate 127 mounting chip components and insertion parts is fixed in position in the chassis angle 122.
4. The print substrate 127 and chassis angle 122, the print substrate 127 and terminal pins 131 of terminal connector 130, and the print substrate 127 and antenna input terminal 123 and antenna output terminal 124 are each soldered with one another by reflow or flow.

5. After adjustment, the upper shield cover 125 and lower shield cover 126 are attached to the chassis angle 122.

[0017] However, in the electronic equipment employing the electronic equipment terminal connector 130 as shown in Fig. 10(a) through Fig. 10(e), i.e., in the electric tuner as shown in Figs. 11(a) and (b) and Fig. 12, when the terminal connector 130 is to be attached to the chassis angle 122, the fixing tongue 141 as shown in Figs. 11(a) and (b) and Fig. 12 is provided at the edge portion of the opening section 122a on a side surface of the chassis angle 122 through which the terminal connector 130 is to be inserted, and the insulator 132 of the terminal connector 130 is fixed on the chassis angle 122 by bending the fixing tongue 141.

[0018] Therefore, a step of bending the fixing tongue 141 is required in the process of attaching the terminal connector 130 to the chassis angle 122, thus making the process complex and operability suffers.

SUMMARY OF THE INVENTION

[0019] The present invention was made to solve the foregoing problems, and it is an object of the present invention to provide an electronic equipment terminal connector, electronic equipment, and electronic equipment terminal connector unit, by which an electronic equipment terminal connector in which a plurality of terminal pins are linked to one another by an insulator can be fixed easily on an electronic equipment chassis (chassis angle) only by inserting the electronic equipment terminal connector into an opening section of the electronic equipment chassis when making attachment.

[0020] In order to achieve the foregoing object, an electronic equipment terminal connector of the present invention is to be attached to an electronic equipment chassis by inserting a portion of an insulator composed of a plurality of terminal pins linked to one another into an opening section of the electronic equipment chassis so as to make an electrical connection between the terminal pins and a substrate portion in the electronic equipment chassis, and the electronic equipment terminal connector is provided with a stop section which stops the insulator on the electronic equipment chassis while the portion of the insulator is inserted into the opening section of the electronic equipment chassis.

[0021] With this arrangement, the electronic equipment terminal connector can be attached to the electronic equipment chassis only by inserting a portion of the insulator of the electronic equipment terminal connector into the opening section of the electronic equipment chassis. Thus, it is not required to provide a conventionally required step of bending a fixing tongue of the electronic equipment chassis by a bezel process, etc., thus improving operability. Further, a process of forming a fixing tongue on the electronic equipment chassis is not required either.

[0022] Further, in order to achieve the foregoing object, electronic equipment of the present invention in which an electronic equipment terminal connector including a plurality of terminal pins which are linked to one another by an insulator is attached to an electronic equipment chassis is arranged such that the electronic equipment terminal connector is attached to the electronic equipment chassis by inserting a portion of the insulator into an opening section of the electronic equipment chassis so as to make an electrical connection between the terminal pins and a substrate portion of the electronic equipment chassis, and the electronic equipment includes a stop section which stops the insulator on the electronic equipment chassis while the portion of the insulator is inserted into the opening section of the electronic equipment chassis.

[0023] With this arrangement, because the opening section is provided on the surface of the electronic equipment chassis where the terminal connector is to be positioned, and the stop section which is stopped at the opening section when the portion of the insulator of the terminal connector is inserted into the opening section is used as the terminal connector, the terminal connector can be easily fixed only by inserting a portion of the insulator into the opening section of the electronic equipment chassis. Thus, it is not required to provide a conventionally required step of bending a fixing tongue of the electronic equipment chassis by a bezel process, etc., thus improving operability. Further, a process of forming a fixing tongue on the electronic equipment chassis is not required either.

[0024] Further, in order to achieve the foregoing object, an electronic equipment terminal connector unit of the present invention has an arrangement in which the electronic equipment terminal connector is provided in plurality, which are linked to one another by a linking member.

[0025] With this arrangement, because a plurality of electronic equipment terminal connectors are linked to one another, they can be attached to the opening section of the electronic equipment chassis at once. Thus, the attachment of plural connectors and chassis can be made by attaching the electronic equipment terminal connector only by inserting it into the chassis and thereafter by cutting the linkage, thus greatly reducing manufacturing time.

[0026] For a fuller understanding of the nature and advantages of the invention, reference should be made to the ensuing detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

Figs. 1(a) and 1(b) are explanatory drawings showing how an electronic equipment terminal connector of the present invention is attached to electronic

equipment, in which Fig. 1(a) shows a state in which a stop section of the electronic equipment terminal connector is inserted into an opening section of a chassis angle of the electronic equipment; and Fig. 1(b) shows a state in which the stop section of the electronic equipment terminal connector is stopped on the side of a print substrate at the opening section of the chassis angle of the electronic equipment.

Figs. 2(a) and (b) show an electric tuner to which the electronic equipment terminal connector of the present invention is attached, in which Fig. 2(a) is a front view; and Fig. 2(b) is a plan view.

Figs. 3(a) through (e) are explanatory drawings showing a schematic arrangement of the electronic equipment terminal connector of the present invention.

Fig. 4 is a cross sectional view of Fig. 3(a) taken along the line A-A.

Fig. 5 is a schematic block diagram of the electric tuner of Figs. 2(a) and (b).

Fig. 6 is an explanatory drawing showing a state in which another electronic equipment terminal connector of the present invention is fixed on the chassis angle of the electronic equipment.

Fig. 7 is a schematic perspective view of an electronic equipment terminal connector unit of the present invention.

Figs. 8(a) and (b) show an electric tuner which employs feed-through capacitors as a connection terminal, in which Fig. 8(a) is a front view; and Fig. 8(b) is a plan view.

Figs. 9(a) and (b) show an electric tuner in which terminal pins as a terminal connector are directly connected to a print substrate, in which Fig. 9(a) is a front view; and Fig. 9(b) is a plan view.

Figs. 10(a) through (e) are explanatory drawings showing a schematic arrangement of a conventional electronic equipment terminal connector.

Figs. 11(a) and (b) show an electric tuner to which the electronic equipment terminal connector of Figs. 10(a) through (e) is attached as a terminal connector, in which Fig. 11(a) is a front view; and Fig. 11(b) is a plan view.

Fig. 12 is a cross sectional view of Fig. 11(a) taken along the line X-X.

DESCRIPTION OF THE EMBODIMENTS

[0028] The following will describe one embodiment of the present invention referring to attached drawings. Note that, the following explanations are based on the case where a connection terminal is applied to an electric tuner as electronic equipment used for television receivers, VCRs, satellite broadcasting receivers, and other electronic devices. Also, the explanations are given based on an electronic tuner used for a television receiver for receiving television signals of the VHF band and UHF band.

[0029] The electric tuner selects a signal of a desired channel from television signals of the VHF band or UHF band which were received by a receiver antenna, and converts the selected signal to an intermediate frequency.

[0030] Fig. 5 shows a basic circuit structure of the electric tuner. In the electric tuner, as shown in Fig. 5, a signal from antenna input (ANTIN) 1 is switched by a first switch 2 to be inputted to a first input circuit 3 when receiving a UHF channel and to a second input circuit 8 when receiving a VHF channel.

[0031] When receiving a UHF channel, a signal from the first input circuit 3 is amplified by a first radio frequency amplifier circuit 4, and via a first inter-stage circuit 5, it is converted to an intermediate frequency by a first frequency converter circuit 6. Then, via a second switch 11, the signal is amplified by a second frequency converter circuit 12, and via an intermediate frequency synchronize circuit 14, it is outputted from an intermediate frequency output terminal 15.

[0032] On the other hand, when receiving a VHF channel, a signal from the second input circuit 8 is amplified by a radio frequency amplifier circuit 9, and via a second inter-stage circuit 10 and through the second switch 11, it is converted to an intermediate frequency by the second frequency converter circuit 12, and via the intermediate frequency synchronize circuit 14, it is outputted from the intermediate frequency output terminal 15.

[0033] Here, the first and second input circuits 3 and 8 (1) cut interference waves near the intermediate frequency by a high-pass filter and (2) synchronize a desired channel frequency by a band-pass filter and prevent a local oscillator signal and intermediate frequency signal from leaking out of the electric tuner. The first and second radio frequency amplifier circuits 4 and 9 amplify received channel signals. The first and second inter-stage circuits 5 and 10 are band-pass filters which synchronize a desired channel frequency and attenuate signals other than the signals of desired channel frequency.

[0034] The local oscillator circuits 7 and 13 oscillate a frequency which is higher than that of the received channel signal by an intermediate frequency. The first and second frequency converter circuits 6 and 12 mix the received channel signal and the oscillation signals produced by the local oscillator circuits 7 and 13, respectively, to convert it into an intermediate frequency, which is the difference between the received channel signal and the oscillation signal. Note here that when receiving a UHF channel, the second frequency converter circuit 12 acts as an amplifier. The intermediate frequency synchronize circuit 14 is a band-pass filter and is synchronized with an intermediate frequency.

[0035] The first switch 2 is switched so that a signal flows to the first input circuit 3 when receiving a UHF signal and to the second input circuit 8 when receiving a

VHF signal.

[0036] The second switch 11 is switch so that a signal flows to the first frequency converter circuit 6 when receiving a UHF signal and to the second inter-stage circuit 10 when receiving a VHF signal.

[0037] The circuits of the electric tuner as shown in Fig. 5 are enclosed in a casing as shown in Fig. 2 (a) and Fig. 2(b), in which Fig. 2(a) is a front view of the electric tuner and Fig. 2(b) is a plan view of the electric tuner.

[0038] As shown in Fig. 2(a) and Fig. 2(b), the electric tuner has an arrangement including a chassis angle 22 as an electronic equipment chassis having a near rectangular shape which opens into upper and lower directions, an upper shield cover 25 covering the upper potion of the chassis angle 22, and a lower shield cover 26 covering the lower portion of the chassis angle 22, and the circuits as shown in Fig. 5 are stored in a space surrounded by the chassis angle 22, upper shield cover 25, and lower shield cover 26.

[0039] On one side of the chassis angle 22 are provided, as shown in Fig. 2(b), an antenna input terminal 23 and antenna output terminal 24. The antenna input terminal 23 receives a signal from the input antenna 1 as shown in Fig. 5.

[0040] Further, on another side of the chassis angle 22 is provided, as shown in Fig. 2(a), a terminal connector 30 as an electronic equipment terminal connector. The terminal connector 30 is electrically connected to a print substrate 27 (Fig. 1(b)) mounting the circuits stored in the chassis angle 22, and it serves as a terminal connector which is connected to supply sources of external voltages and data, etc., such as the voltage for driving the inner circuits of, for example, amplifier circuits, local oscillator circuits, and frequency converter circuits, and the synchronize voltage for synchronizing the band-pass filters of the input circuits and inter-stage circuits, and PLL control data when making the synchronization by PLL.

[0041] As shown in Fig. 3(a) through Fig. 3(e), the terminal connector 30 has an arrangement in which a plurality of terminal pins 31 are linked to one another in a near straight line by an insulator 32.

[0042] The insulator 32 is made of a resin material having an insulating property, and has an integral structure including a platform section 32a of a near rectangular shape, two insertion sections 32b being provided on the platform section 32a as a portion of the insulator 32 and having a near rectangular shape and smaller than the platform section 32a, and a stop section 32c which is formed between the insertion sections 32b on the plat form section 32a.

[0043] The platform section 32a is larger than an opening section 22a (Fig. 1(b)) of the chassis angle 22, and the insertion sections 32b are provided with the size which is insertable into the opening section. Thus, when the insulator 32 is attached to the chassis angle 22, only the platform section 32a is exposed.

[0044] The terminal pins 31 are formed at predetermined intervals, penetrating through the platform section 32a and insertion sections 32b, and as shown in Fig. 3(d) and Fig. 3(e), the end of the terminal pins 31 on the side of the insertion sections 32b is bent. Thus, when the terminal connector 30 is attached to the chassis angle 22, the terminal pins 31 are brought into contact with the connecting section of the print substrate 27 (Fig. 1(b)) in the chassis angle 22.

[0045] As shown in Fig. 3(a) through Fig. 3(e), the stop section 32c is formed outside of the side edge in the width direction of the insertion sections 32b, and is thicker than the insertion sections 32b. The stop section 32c is provided on the both sides in upper and lower directions of the terminal pins 31, and as shown in Fig. 1(a) and Fig. 1(b), the stop section 32c is stopped at the opening section 22a of the chassis angle 22. Namely, the stop section 32c is provided with a projecting section 32d such that the stop section 32c is stopped on the edge of the opening section 22a on the side of the print substrate 27 while the insertion sections 32b constituting the insulator 32 are partially inserted into the opening section 22a of the chassis angle 22.

[0046] Fig. 1(b) is a side cross section of a main portion in the vicinity of where the terminal connector 30 is stopped by the stop section 32c. That is, as shown in Fig. 1(a), when inserting the terminal connector 30 into the opening section 22a of the chassis angle 22, the stop section 32c being separated by a predetermined gap on the both sides of the terminal pins 31 is pushed inward to approach the terminal pins 31. Then, as shown in Fig. 1(b), when inserted completely, the stop section 32c returns to its original shape by the elasticity of the insulator 32, thus fixing the terminal connector 30 as the projecting section 32d of the stop section 32c is locked with the inner surface on the edge of the opening section 22a of the chassis angle 22. Namely, as shown in Fig. 1(b), the terminal connector 30 is fixed as the projecting section 32d of the stop section 32c of the terminal connector 30 is locked with the inner surface on the edge of the opening section 22a of the chassis angle 22.

[0047] Note that, in the present embodiment, the stop section 32c is separated on the both sides so as to be stopped on the upper and lower sides of the opening section 22a of the chassis angle 22, thus fixing the terminal connector 30 further stably on the chassis angle 22.

[0048] As described, with the terminal connector 30 having the described arrangement, the terminal connector 30 can easily be fixed on the chassis angle 22 only by inserting it into the opening section 22a of the chassis angle 22 constituting the electric tuner. Thus, it is not required to carry out the conventionally required step of bending the fixing tongue of the chassis by a bezel process, etc., thus improving operability. Further, a process of forming the fixing tongue on the chassis is not required either.

[0049] Instead of the stop section 32c of the terminal connector 30, it is possible alternatively to provide a stop section 32e having a notch 32f at predetermined positions as shown in Fig. 6. In this case, a fixing section 22b having on its inner surface a projecting section 22c for stopping the notch 32f of the stop section 32e is provided outwardly at the opening section 22a of the chassis angle 22.

[0050] Namely, as shown in Fig. 6, when the stop section 32e of the insulator 32 of the terminal connector 30 is inserted into the fixing section 22b of the chassis angle 22, the projecting section 22c on the inner surface of the fixing section 22b is stopped by the notch 32f of the stop section 32e, thus fixing the terminal connector 30.

[0051] In the state as shown in Fig. 6, when inserting the terminal connector 30 into the opening section 22a of the chassis angle 22, the attachment of the terminal connector 30 is made by utilizing the elasticity of the insulator 32 of the terminal connector 30 and of the projecting section 22c of the chassis angle 22, and when inserted, the projecting section 22c of the chassis angle 22 is engaged with the notch 32f of the stop section 32e of the terminal connector 30, thus fixing the terminal connector 30.

[0052] With this arrangement, as with the case of attaching the terminal connector 30 of Fig. 1(a) and Fig. 1(b) to the chassis angle 22, the terminal connector 30 can easily be fixed on the chassis angle 22 only by inserting the stop section 32e of the terminal connector 30 into the opening section 22a of the chassis angle 22. Thus, it is not required to carry out the conventionally required step of bending the fixing tongue of the chassis by a bezel process, etc., thus improving operability.

[0053] When the terminal connector 30 having the described arrangement is to be connected to the chassis angle 22 of the electric tuner, it takes effort to attach the terminal connector 30 to the chassis angle 22 one by one. Thus, in order to be efficient, as shown in Fig. 7, an electronic equipment terminal connector unit in which a plurality of terminal connectors 30 are linked to one another may be used. Namely, by using a plurality of terminal connectors 30 in which platform sections 32a of insulators 32 are connected to one another by arm section 32g as a linking member, and by positioning a plurality of chassis angles 22 at the same interval with the linked terminal connectors 30, it is possible to make attachment at once. Then, after attached, the arm section 32g is cut, thus obtaining the electric tuner with the terminal connector 30 attached conveniently and in a short period of time.

[0054] The above electronic equipment terminal connector unit is arranged such that a plurality of insulators 32 are linked to one another by the arm section 32g. However, the electronic equipment terminal connector unit can be manufactured more easily when it is integrally formed using a resin material having an insulating property. In such a case, the stop section 32c or 32e is formed simultaneously in the manufacturing process.

[0055] Thus, with the electronic equipment terminal connector unit having this arrangement, manufacturing time of the electric tuner can be greatly reduced. Note that, in Fig. 7, when connecting the platform sections 32a of the insulators 32 to one another, the linkage is made at two locations by the arm section 32g. However, not limiting to this, the linkage may be made at a single location or three or more locations.

[0056] Note that, the above embodiment described the case where only a single stop section 32c or 32e is provided stretching over the upper and lower sides. However, it may be provided in plurality, or alternatively a single of plural stop sections 32c or 32e may be provided only on one side. Further, the size of the stop sections 32c and 32e are not particularly limited and it can be changed appropriately.

[0057] Further, the positions of the stop sections 32c and 32e are not particularly limited as long as they allow the terminal connector 30 to be fixed on the chassis angle 22, and they can be provided at arbitrary positions.

[0058] Also, the above embodiment described the case where the terminal connector is applied to the electric tuner of the television receiver. However, the present invention is not limited to this, and as long as the terminal connector has the arrangement in which a plurality of connector pins are linked by an insulator, the present invention is applicable to any electronic equipment.

[0059] A first electronic equipment terminal connector of the present invention is composed of a plurality of terminal pins which are linked to one another by an insulator and is to be positioned on the surface of the electronic equipment chassis on which an opening section is provided, and the first electronic equipment terminal connector has an arrangement in which a projectile stop section is provided so as to be stopped on the inner surface on the edge of the opening section when inserted into the opening section of the electronic equipment chassis.

[0060] With the arrangement of the first electronic equipment terminal connector, because the projectile stop section is provided so as to be stopped and fixed on the inner surface on the edge of the opening section when inserted into the opening section of the electronic equipment chassis, the connector can be fixed easily only by inserting it into the opening section of the electronic equipment chassis. Thus, it is not required to provide a conventionally required step of bending a fixing tongue of the electronic equipment chassis by a bezel process, etc., thus improving operability. Further, a process of forming a fixing tongue on the electronic equipment chassis is not required either.

[0061] A second electronic equipment terminal connector of the present invention, having the arrangement of the first electronic equipment terminal connector, has

an arrangement in which the stop section is provided on the both sides of the opening section so as to be stopped on the upper and lower sides of the opening section of the electronic equipment chassis.

[0062] With the arrangement of the second electronic equipment terminal connector, because the stop section is provided on the both sides of the opening section so as to be stopped on the upper and lower sides of the opening section of the electronic equipment chassis, the electronic equipment terminal connector can be fixed on the chassis further stably.

[0063] A third electronic equipment terminal connector of the present invention, having the arrangement of the first or second electronic equipment terminal connector, has an arrangement in which the stop section is provided on the insulator.

[0064] With the arrangement of the third electronic equipment terminal connector, because the stop section is formed on the insulator, the stop section can be easily provided. Namely, when forming the electronic equipment terminal connector by linking a plurality of terminal pins by resin molding, by using a molding cast for the stop section, the first or second electronic equipment terminal connector can be realized with ease.

[0065] First electronic equipment of the present invention includes the electronic equipment terminal connector which is composed of a plurality of terminal pins which are linked to one another by an insulator and which is to be positioned on at least one surface of the electronic equipment chassis, and the first electronic equipment has an arrangement in which an opening section is provided on the surface of the chassis on which the connector is to be positioned, and a projectile stop section is provided on the terminal connector so as to be stopped and fixed on the inner surface on the edge of the opening section when inserted into the opening section.

[0066] With the arrangement of the first electronic equipment, because the opening section is provided on the surface of the chassis on which the connector is to be positioned and the projectile stop section is provided on the terminal connector so as to be stopped and fixed on the inner surface on the edge of the opening section when inserted into the opening section, the terminal connector can be fixed easily only by inserting it into the opening section of the chassis.

[0067] Thus, it is not required to provide a conventionally required step of bending a fixing tongue of the electronic equipment chassis by a bezel process, etc., thus improving operability. Further, a process of forming the fixing tongue on the electronic equipment chassis is not required either.

[0068] Second electronic equipment of the present invention includes the electronic equipment terminal connector which is composed of a plurality of terminal pins which are linked to one another by an insulator and which is to be positioned on at least one surface of the electronic equipment chassis, and the second electronic equipment has an arrangement in which an opening section is provided on the surface of the chassis on which the terminal connector is to be provided, and a fixing section having on its inner surface a projection is provided outwardly on the both sides at least partially on the edge of the opening section, and a notched stop section is provided on the terminal connector so as to be stopped and fixed by the projection when inserted into the opening section.

[0069] With the arrangement of the second electronic equipment, because the opening section is provided on the surface of the chassis on which the terminal connector is to be provided, and a fixing section having on its inner surface a projection is provided outwardly on the both sides at least partially on the edge of the opening section, and a notched stop section is provided on the terminal connector so as to be stopped and fixed by the projection when inserted into the opening section, the terminal connector can be fixed easily only by inserting it into the opening section of the electronic equipment chassis. Thus, it is not required to provide a conventionally required step of bending a fixing tongue of the electronic equipment chassis, thus improving operability.

[0070] Further, an electronic equipment terminal connector, having the arrangement of one of the first through third electronic equipment terminal connector, or to be used for the first or second electronic equipment, has an arrangement in which a plurality of electronic equipment terminal connectors are linked to one another, and they can be attached at once to the opening section of a plurality of electronic equipment chassis.

[0071] With the arrangement of this electronic equipment terminal connector, because a plurality of electronic equipment terminal connectors are linked to one another, and they can be attached at once to the opening section of a plurality of electronic equipment chassis, the attachment of plural connectors and chassis can be made by attaching the electronic equipment terminal connector only by inserting it into the electronic equipment chassis and thereafter by cutting the linkage, thus greatly reducing manufacturing time.

[0072] The invention being thus described, it will be obvious that the same way may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

Claims

1. An electronic equipment terminal connector to be attached to an electronic equipment chassis (22) by inserting a portion (32b) of an insulator (32) composed of a plurality of terminal pins (31) linked to one another into an opening section (22a) of the

electronic equipment chassis (22) so as to make an electrical connection between the terminal pins (31) and a substrate portion (27) in the electronic equipment chassis (22),

said electronic equipment terminal connector characterized by including a stop section (32c, 32e) which stops the insulator (32) on the electronic equipment chassis (22) while the portion (32b) of the insulator is inserted into the opening section (22a) of the electronic equipment chassis (22).

2. The electronic equipment terminal connector as set forth in claim 1, characterized in that said stop section (32c) includes a projecting section (32d) so that the insulator (32) is stopped at an edge of the opening section (22a) on a side of the substrate portion (27) while the portion (32b) of the insulator (32) is inserted into the opening section (22a) of the electronic equipment chassis (22).

3. The electronic equipment terminal connector as set forth in claim 1, characterized in that said stop section (32e) includes a notch (32f) which is engaged with a projecting section (22c) of the opening section (22a) while the portion (32b) of the insulator (32) is inserted into the opening section (22a) of the electronic equipment chassis (22).

4. The electronic equipment terminal connector as set forth in claim 1, characterized in that said stop section (32c, 32e) is provided on the insulator (32).

5. The electronic equipment terminal connector as set forth in claim 1, characterized in that said stop section (32c, 32e) is integrally provided with the insulator (32).

6. The electronic equipment terminal connector as set forth in claim 1, characterized in that the insulator (32) includes a platform section (32a) which is to contact an outer surface on a periphery of the opening section (22a) of the electronic equipment chassis (22) and an insertion section (32b) which is provided on the platform section (32a) and which is insertable into the opening section (22a), and

said stop section (32c, 32e) is provided so as to be stopped at the opening section (22a) when the insertion section (32b) is inserted into the opening section (22a).

7. The electronic equipment terminal connector as set forth in claim 6, characterized in that said stop section (32c, 32e) is provided at an arbitrary position on the platform section (32a).

8. The electronic equipment terminal connector as set forth in claim 6, characterized in that said stop section (32c) includes a projecting section (32d) so that the insulator (32) is stopped at an edge of the opening section (22a) on a side of the substrate portion (27) while the insertion section (32b) is inserted into the opening section (22a) of the electronic equipment chassis (22).

9. The electronic equipment terminal connector as set forth in claim 6, characterized in that said stop section (32e) includes a notch (32f) which is engaged with a projecting section (22c) of the opening section (22a) while the insertion section (32b) is inserted into the opening section (22a) of the electronic equipment chassis (22).

10. Electronic equipment in which an electronic equipment terminal connector (30) including a plurality of terminal pins (31) which are linked to one another by an insulator (32) is attached to an electronic equipment chassis (22),

said electronic equipment characterized in that the electronic equipment terminal connector (30) is attached to the electronic equipment chassis (22) by inserting a portion (32b) of the insulator (32) into an opening section (22a) of the electronic equipment chassis (22) so as to make an electrical connection between the terminal pins (31) and a substrate portion (27) of the electronic equipment chassis (22), and
said electronic equipment includes a stop section (32c, 32e) which stops the insulator (32) on the electronic equipment chassis (22) while the portion (32b) of the insulator (32) is inserted into the opening section (22a) of the electronic equipment chassis (22).

11. The electronic equipment as set forth in claim 10, characterized in that said stop section (32c) includes a projecting section (32d) so that the insulator (32) is stopped at an edge of the opening section (22a) on a side of the substrate portion (27) while the portion (32b) of the insulator (32) is inserted into the opening section (22a) of the electronic equipment chassis (22).

12. The electronic equipment as set forth in claim 10, characterized in that said stop section (32e) includes a notch (32f) which is engaged with a projecting section (22c) of the opening section (22a) while the portion (32b) of the insulator (32) is inserted into the opening section (22a) of the electronic equipment chassis (22).

13. The electronic equipment as set forth in claim 10, characterized in that said stop section (32c, 32e) is

provided on the insulator (32).

14. The electronic equipment as set forth in claim 10, characterized in that said stop section (32c, 32e) is integrally provided with the insulator (32).

15. The electronic equipment as set forth in claim 10, characterized in that the insulator (32) includes a platform section (32a) which is to contact the opening section (22a) of the electronic equipment chassis (22) and an insertion section (32b) which is provided on the platform section (32a) and which is engageable with the opening section (22a), and

said stop section (32c, 32e) is provided so as to be stopped at the opening section (22a) when the insertion section (32b) is engaged with the opening section (22a).

16. The electronic equipment as set forth in claim 15, characterized in that said stop section (32c, 32e) is provided at an arbitrary position on the platform section (32a).

17. The electronic equipment as set forth in claim 15, characterized in that said stop section (32c) includes a projecting section (32d) so that the insulator (32) is stopped at an edge of the opening section (22a) on a side of the substrate portion (27) while the insertion section (32b) is inserted into the opening section (22a) of the electronic equipment chassis (22).

18. The electronic equipment as set forth in claim 15, characterized in that said stop section (32e) includes a notch (32f) which is engaged with a projecting section (22c) of the opening section (22a) while the insertion section (32b) is inserted into the opening section (22a) of the electronic equipment chassis (22).

19. An electronic equipment terminal connector unit including the electronic equipment terminal connector (30) of claim 1 in plurality, the electronic equipment terminal connectors (30) being linked to one another by a linking member.

20. An electronic equipment terminal connector unit including the electronic equipment terminal connector (30) provided in the electronic equipment of claim 10 in plurality, the electronic equipment terminal connectors (30) being linked to one another by a linking member.

21. A terminal unit for an electronic equipment having a chassis portion formed with an opening, the unit having an insulating base and a plurality of terminal elements mounted in said insulating base so as to extend through said opening when the unit is mounted thereto with a portion of the insulating base disposed within the opening, wherein the terminal unit includes an engagement portion for firmly engaging the chassis so as to hold the terminal unit in position, said engagement portion being arranged to come into firm engagement with said chassis when said portion of the insulating base is inserted into said opening.

FIG. 1 (a)

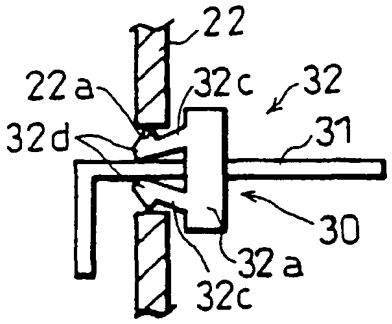


FIG. 1 (b)

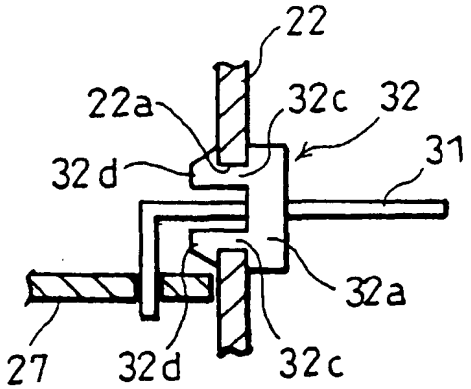


FIG. 2(b)

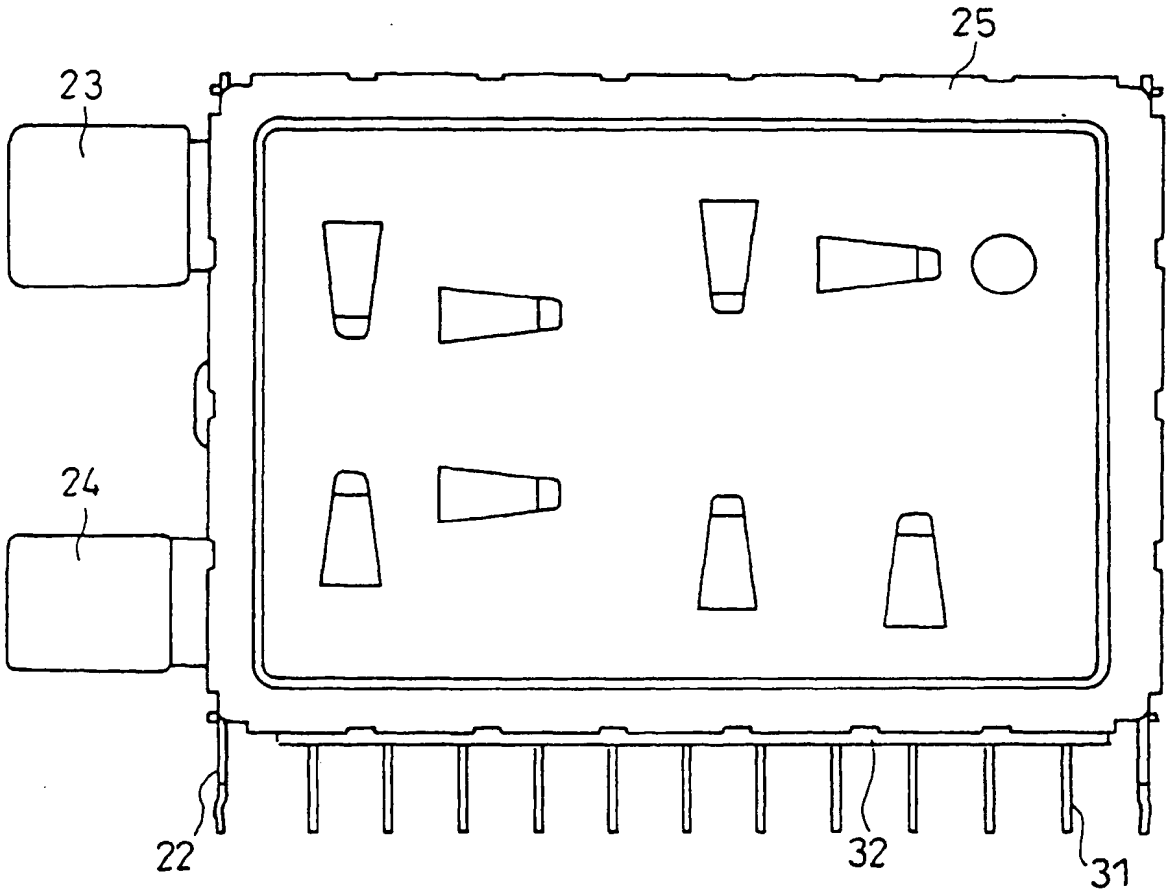


FIG. 2(a)

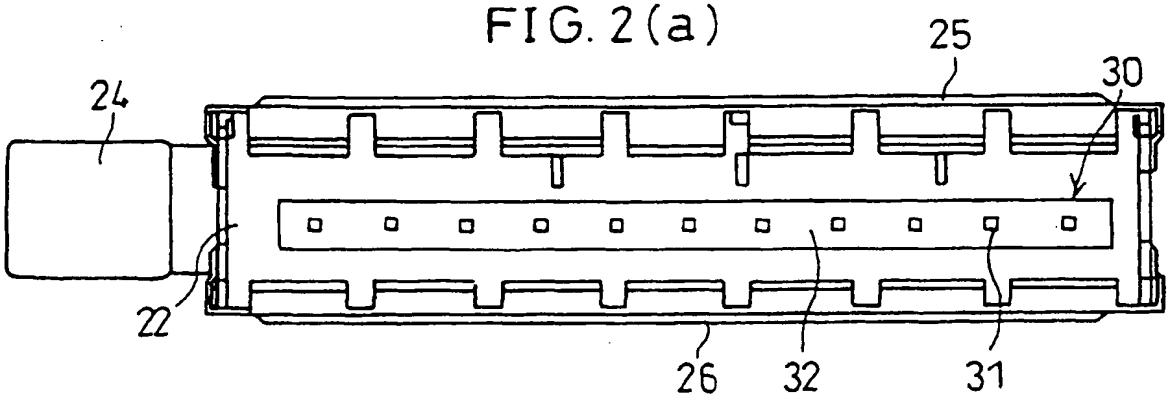


FIG.3(b)

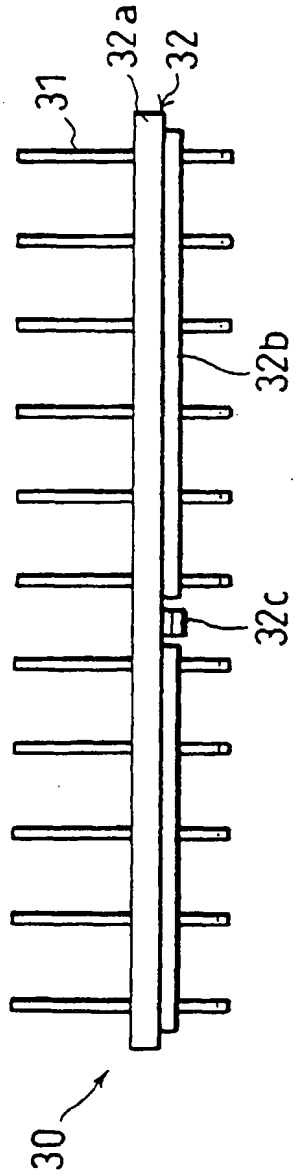


FIG.3(a)

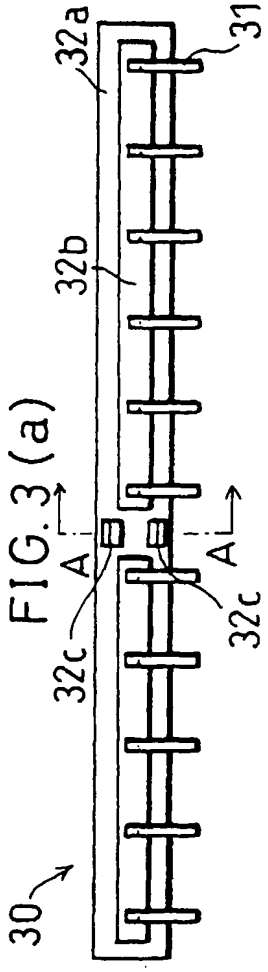


FIG.3(c)

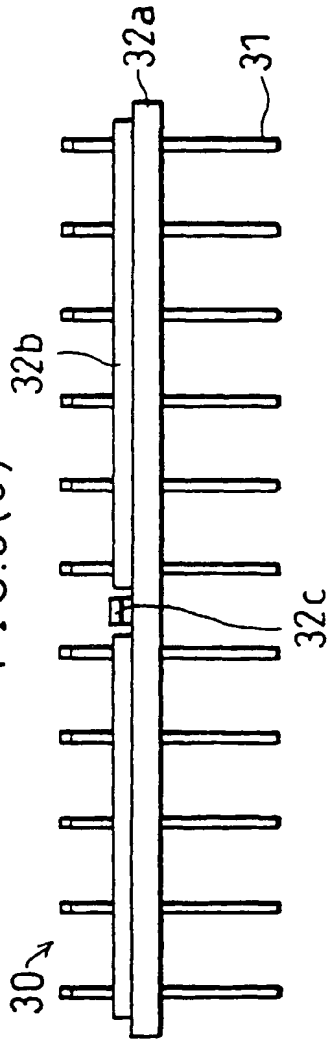


FIG.3(d)

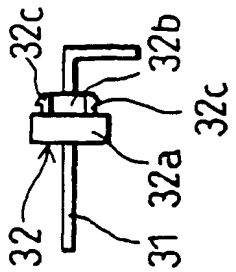


FIG.3(e)

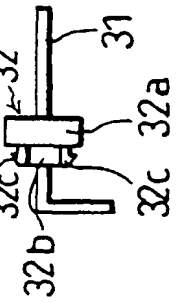


FIG. 4

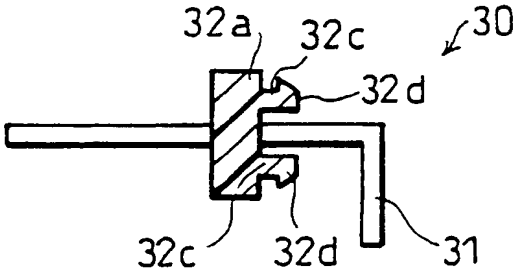


FIG. 5

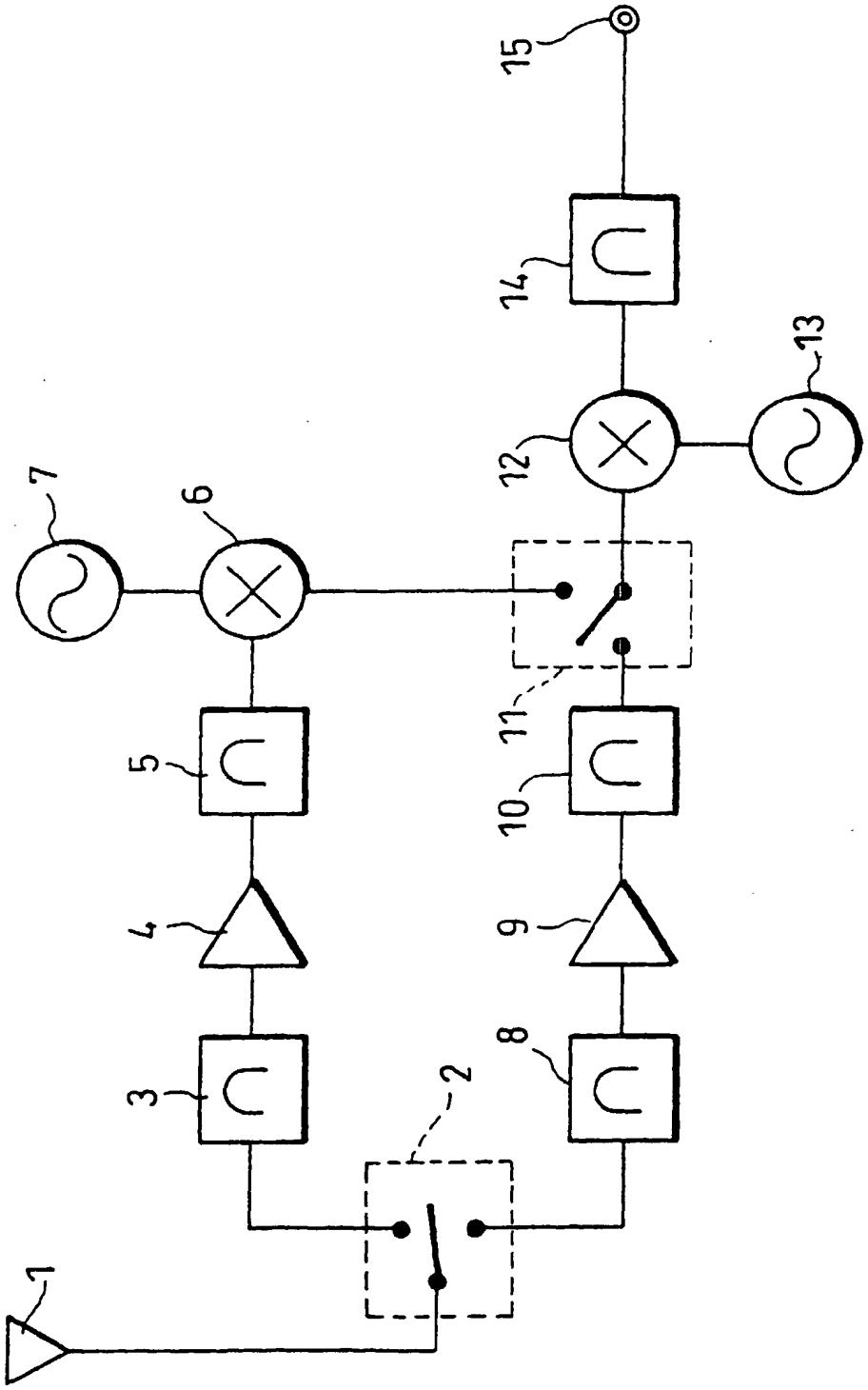
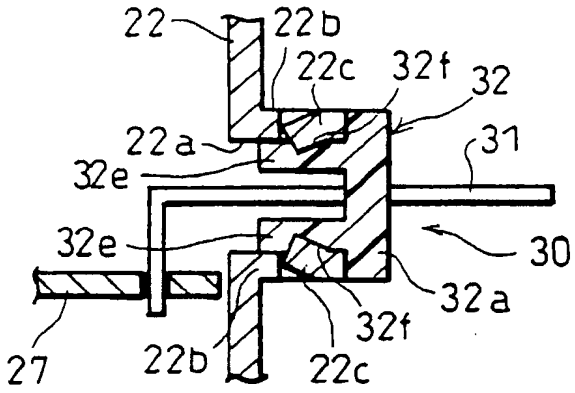


FIG. 6



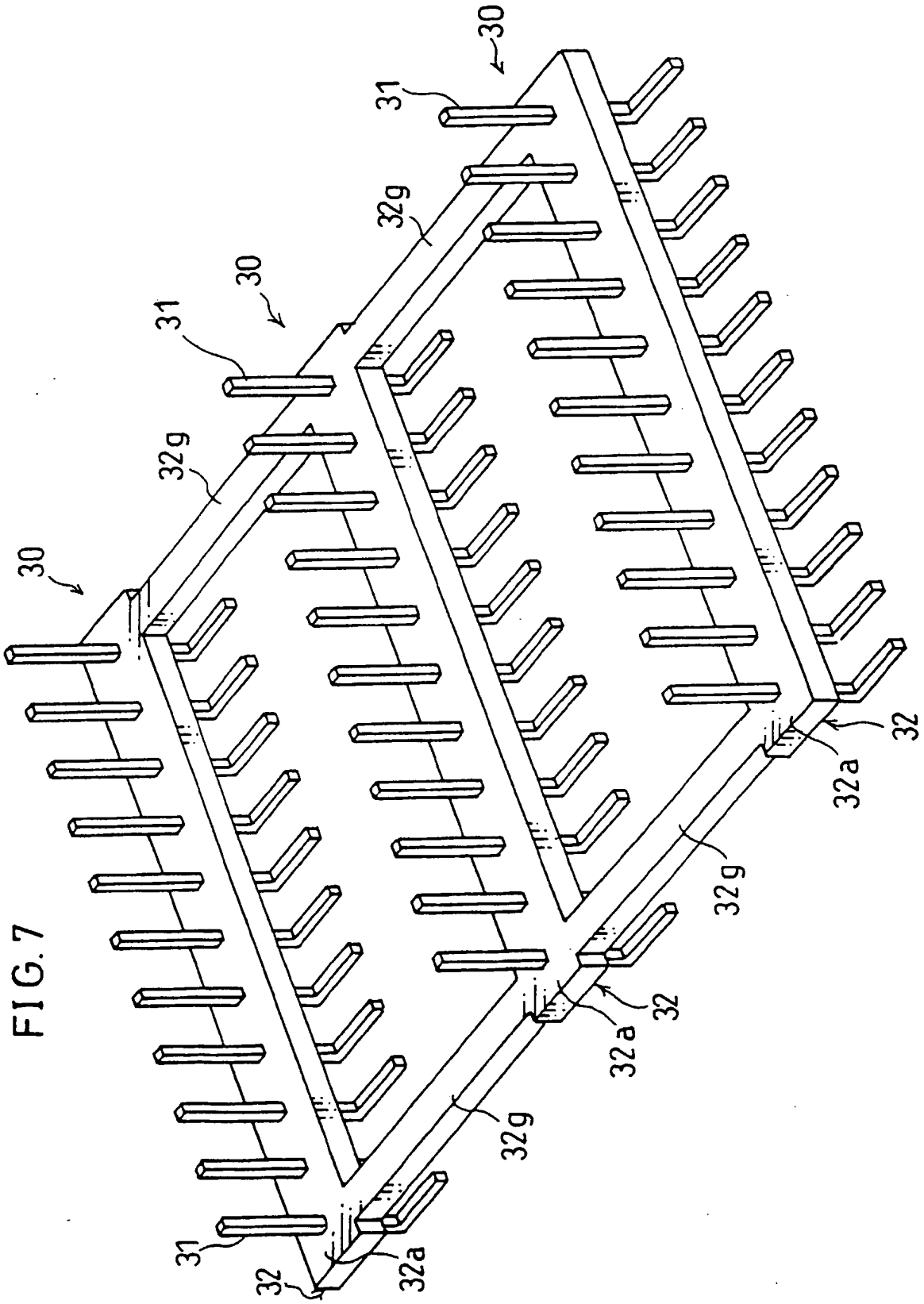


FIG. 7

FIG. 8 (b)

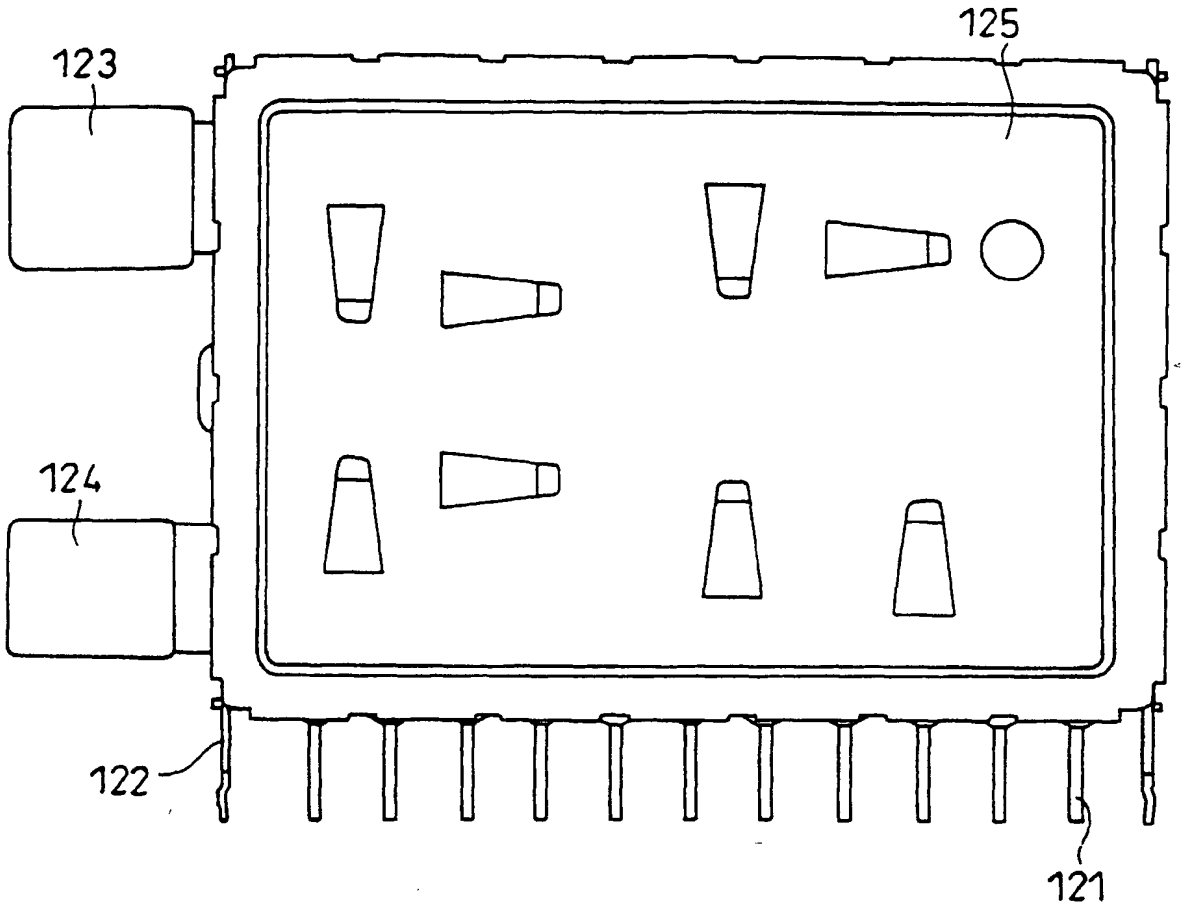


FIG. 8(a)

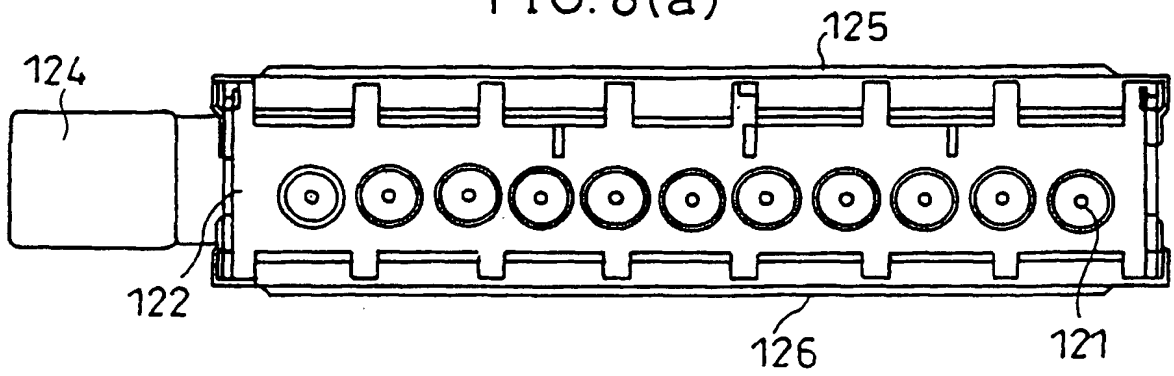


FIG. 9(b)

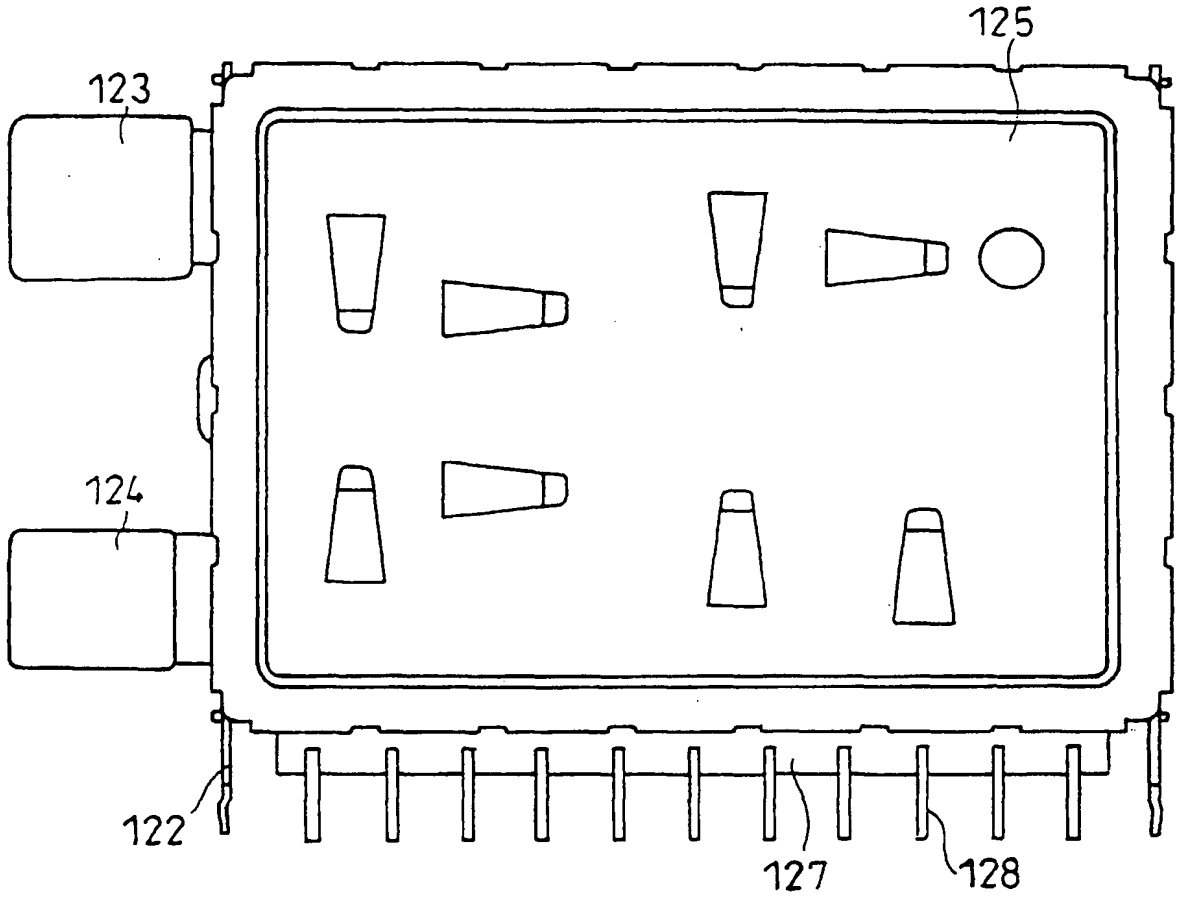


FIG.9(a)

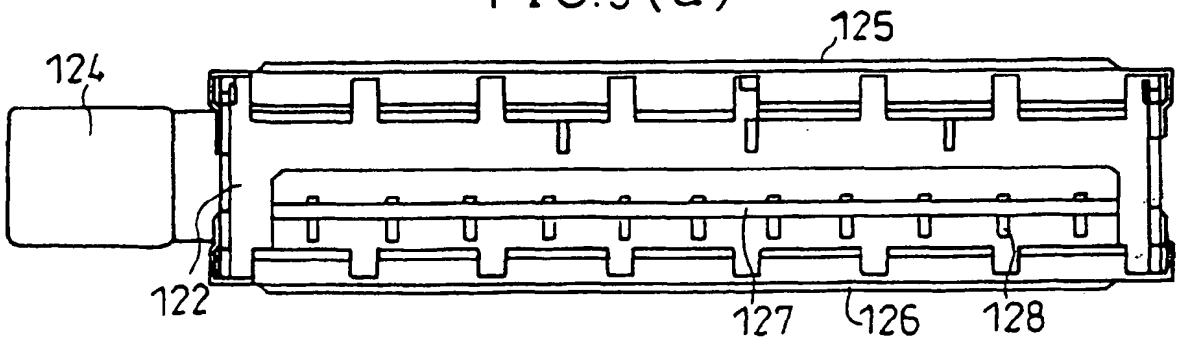


FIG. 10(b)

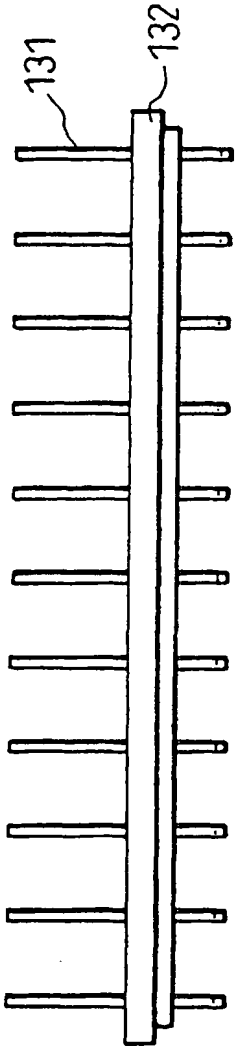


FIG.10(a)

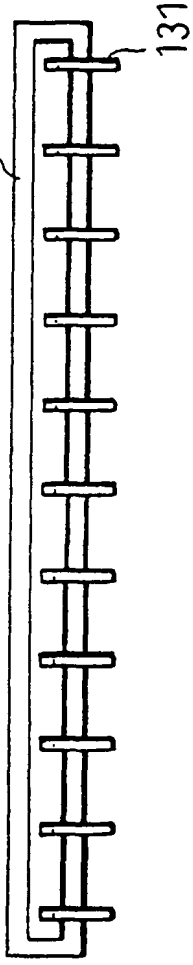


FIG.10(c)

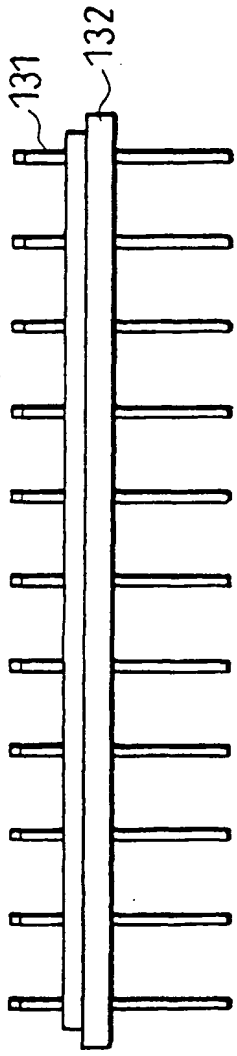


FIG.10(d)

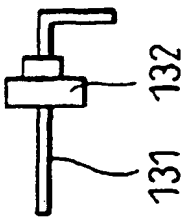


FIG.10(e)

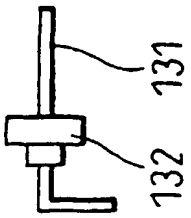


FIG. 11(b)

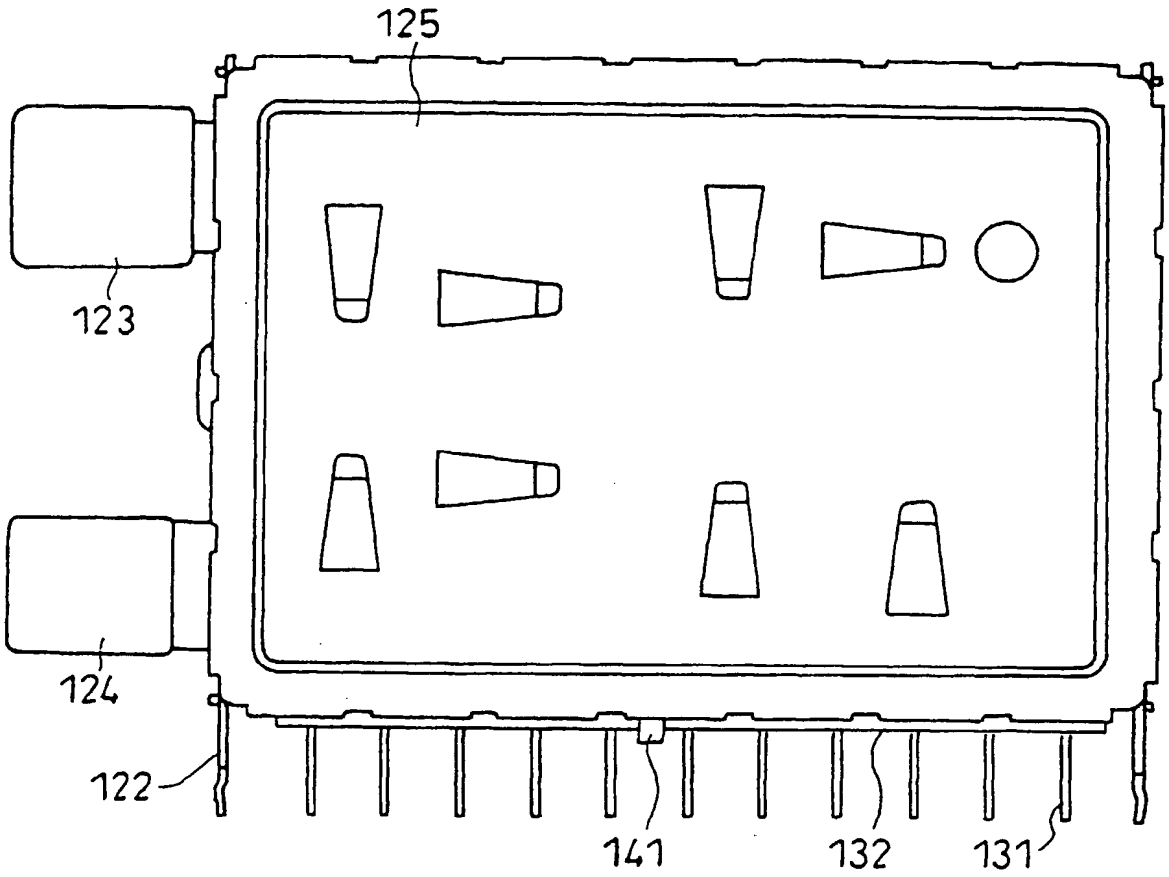


FIG. 11(a)

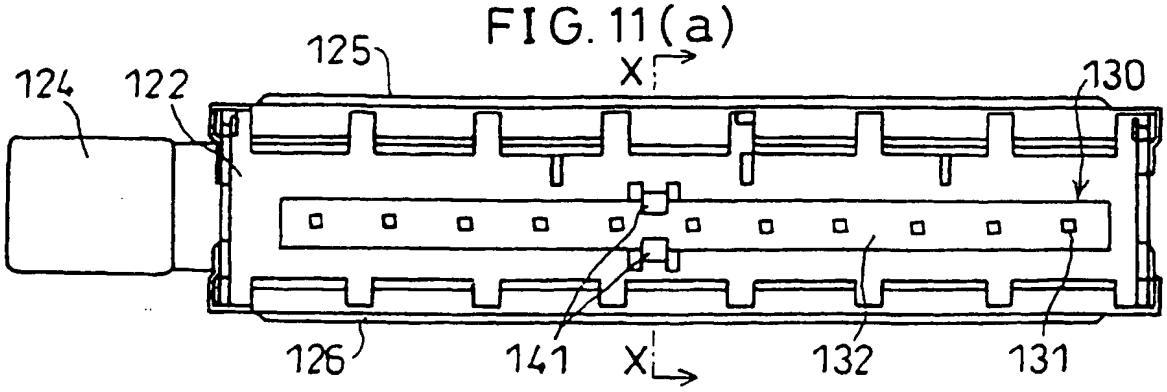
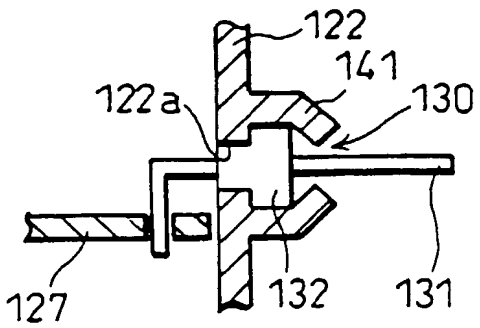


FIG. 12



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 30 0639

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	US 3 530 426 A (SNYDER CLAIR WILSON JR) 22 September 1970 (1970-09-22) * the whole document * ---	1,2,4,5, 10,11, 13,14,21 6-8, 15-17	H01R13/74
Y	US 5 632 628 A (WAGNER DOUGLAS L) 27 May 1997 (1997-05-27) * figures 1,2 * * column 2, line 1-10 * ---	6-8, 15-17	
A	US 3 643 205 A (ELKINS LUEJENE) 15 February 1972 (1972-02-15) * figure 6 * * column 1, line 71-75 * * column 3, line 15-25 * ---	3,9,12, 18	
A	US 5 145 385 A (TAKANO TSUNESUKE) 8 September 1992 (1992-09-08) * figures 5A,6A * * column 5, line 30-35 * ---	3,9,12, 18	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	DE 36 05 063 C (JAAG DIETER, METZ ALBERT) 1 October 1987 (1987-10-01) * the whole document * -----	1-21	H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	18 July 2000	Marcolini, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 30 0639

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-07-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3530426 A	22-09-1970	NONE	
US 5632628 A	27-05-1997	NONE	
US 3643205 A	15-02-1972	CA 931648 A	07-08-1973
		CH 512831 A	15-09-1971
		DE 2050268 A	22-04-1971
		FR 2065360 A	23-07-1971
		GB 1323578 A	18-07-1973
		IL 35435 A	30-07-1973
		JP 51045075 B	02-12-1976
		NL 7014564 A	15-04-1971
		SE 377235 B	23-06-1975
US 5145385 A	08-09-1992	DE 4119685 A	09-01-1992
		GB 2246248 A,B	22-01-1992
		HK 52795 A	13-04-1995
		IT 1251096 B	04-05-1995
DE 3605063 C	01-10-1987	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82